THE GLASS INDUSTRY

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MELTING PERFORMANCE OF TANK FURNACES

Isn't it about time for the glass industry to abandon the awkward and illogical expression for melting performance of tank furnaces, "melting on so many square feet"? The problem of melting performance of various tanks and different batches has been largely neglected and it is possible that some of this neglect may be due to the desire to side-step the inconvenient and misleading unit. The disadvantages of this unit have frequently been pointed out* and it has been largely abandoned everywhere but in the United States. Here, however, we continue to be like Mark Twain and the weather.

The most convenient unit and one which has been found quite practical is tons per twenty-four hours per 100 square feet of melting area, or, more briefly, tons per 100 square feet. This is a unit of convenient size because it can usually be rounded off into whole numbers and still retain sufficient accuracy. With an ordinary sized furnace, rounding off makes a difference of less than five tons on the daily pull, a difference so small that it usually can be neglected. But should some purist prefer tons per square foot, he needs only move the decimal point in order to obtain it.

For the practical man, the main advantage of thinking in terms of tons per 100 square feet is the fact that it is easily visualized. Everyone knows within the nearest 100 square feet how big his tanks are and if a 500 square foot furnace is melting 100 tons a day, it is easily seen that the melting rate is twenty tons per 100. It is equally obvious that a 250 square foot furnace should melt half as much, that is, fifty tons, if the rate is to be the same.

From the rules of logic, we are free to choose our independent and dependent variables as we see fit, but the custom is so firmly established of making the denominator of the fraction the thing that we cannot change and using in the numerator the thing we can vary at will that it has become a part of our thinking habits. Thus we have miles per hour, revolutions per minute, cents per pound, and so on. We cannot change an hour but we can take our foot off the gas pedal. We cannot change the length of a minute but we can speed up or slow down a wheel; and if the OPA permits, we can change a price tag but not the weight of a pound. This is why the "on square feet" method, that is, square feet per ton, is so contrary to our habits of thought. The operator can put on or take off tonnage at will within limits, but the size of the tank is the one thing which we cannot change, at least not during the fire.

As an example, you probably remember that the speedometers on the cars we used to drive are calibrated in miles per hour. Now suppose the legislature would set the speed limits as the number of hours which should elapse in driving 100 miles. For instance, in school zones it might be five hours, in town three hours, and on the openroad say two hours. Imagine you embarrassment on hearing the policeman telling the judge, "He was going through an 'in three hour' zone and I clocked him at 2.8." This may seem a little on the silly side, but it is no more ridiculous than watching the pull all day in tons, knowing the melting area all the time and then trying to think in terms of "on square feet."

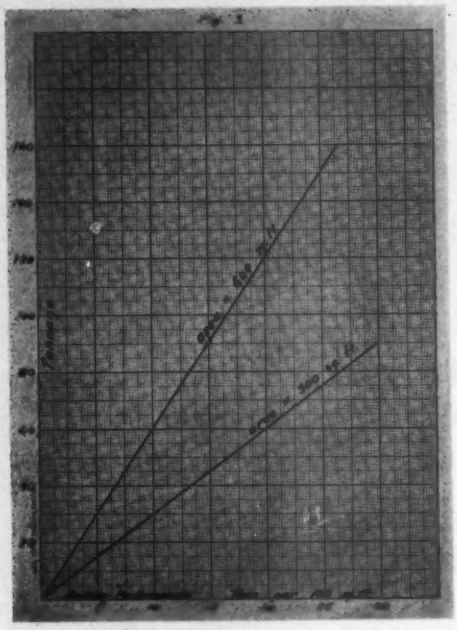
Another advantage of keeping all records and arguments in tons per 100 square feet is the fact that the various records can be easily converted back and forth. If the total glass melted during the week is compiled, simply dividing this total by the number of working days and the area gives a figure which is the average daily performance for the week. The same thing applies just as well to a month, a year, or a campaign. Those responsible for production will always know whether or not they are equaling past performance. Conversely, if the performance in tons per 100 square feet is known, it is a simple matter to calculate how much glass will be melted in a day, month, or year. But the square feet to melt a ton cannot be averaged, added or compared in any way. It is a figure which is unique for one tank at one pull.

For those who enjoy a mathematical approach, it can be shown that when tonnage is plotted against melting performance in tons per 100 square feet, the resulting curves are straight lines. Fig. 1 shows typical curves for a furnace with a melting area of 600 square feet and one with 300 square feet. The equation for these curves is given by

$$y = Ax$$

where y is the tonnage
x is the melting performance
and A is the area.

*Data on the Melting Performance and Heat Consumption of Tank Furnaces. R. Guenther. GLASS INDUSTRY 22, 66 (1941).



The straight line means that the performance for the same tank is always directly and linearly proportional to the tonnage. Double the tonnage and you have doubled the performance and *vice versa*. Decrease the tonnage by 10 per cent and the performance is only 90 per cent of what it was before. Unfortunately, we shall see later that this is not the case with the "on square feet" business.

The area of the tank, A, determines the slope of the line which simply means that the performance figure will increase faster on a small tank than on a large one for the same tonnage increase. This is quite as it should be, for everyone knows that the larger the tank the easier it is to put on a few extra tons.

Or to present the same thing in a manner which will appeal to our mathematical friends,

$$y = Ax$$

If tonnage is increased by an amount b, then

$$y + b = Ax + b.$$

Putting this in the original form,

$$y + b = \frac{A\,(x + b)}{A}$$

that is, with increased tonnage the new melting performance is given by $x + \frac{b}{A}$, and with tanks of various sizes the effect of increased tonnage is inversely proportional to the area.

The facts that the curves all pass through the origin is also a beautiful detail. A zero melting performance simply shows that the tank is standing idle, the tonnage is zero.

Now to examine our decrepit old friend, the "on square feet" unit. Let y equal tonnage and A the melting end area as before, and x equal performance but this time in square feet per ton. The equation for the graphs becomes

$$xy = A$$

This is the equation of an equilateral hyperbola asymptotic to the ordinates. And not only is it a hyperbola, but the hyperbola is backward, as you might say. Fig. 2 shows the graph for the same two tanks which were plotted in Fig. 1.

The equation could be written

$$y = \frac{A}{x}$$

and if b is an increase in tonnage then

$$y + b = \frac{A}{x} + b$$

To put this in the original form, we would have to write

$$\frac{Ax}{A + bx}(y + b) = A$$

Thus we see that when tonnage is increased, the new melting performance is a complex function depending on the size of the furnace and the original pull.

All of the above can be expressed more simply by saying that in Fig. 1 where performance is given in tons per 100 square feet

$$\frac{dy}{dx} = A$$

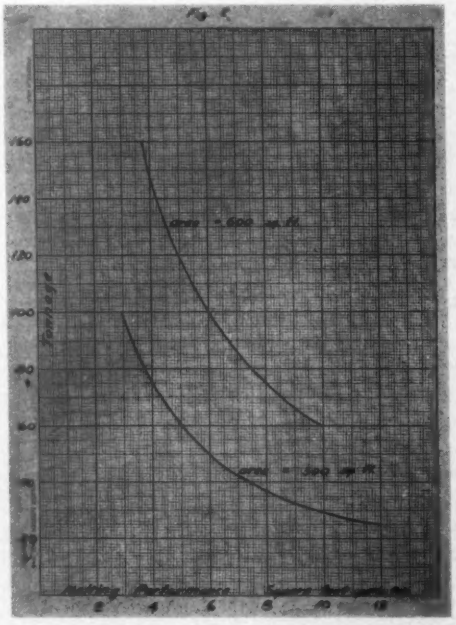
while in Fig. 2 where performance is given in square feet per ton then

$$\frac{dy}{dx} = \frac{-A}{x^2}$$

And that just about tells the whole story.

The readers who spend a great deal of their time drawing hyperbolas (and such there no doubt are) will recognize at once that the area, A, equal $\frac{a^2}{2}$ where a is the

(*Continued on page* 312)



NON-CRITICAL MATERIALS BASIS OF HARTFORD-EMPIRE'S NEW GLASS PACKAGE

The Hartford-Empire Company announced a new side seal glass closure in the June, 1943 issue of the Glass Packer. This closure design permits the use of non-critical gasket materials which lack some of the elastic and recovery characteristics of rubber. However, in application the gasket is a snug fit on the jar and presents a sharp corner for initial seal in the cap as shown (Fig. 1). When the cap is pressed home the gasket is forced into compact sealing contact with the finish and the cap (Fig. 2).

The announcement of this latest Hartford development has produced requests for additional information relative to manufacture, costs, utility, etc. This article discusses some such questions as related to the glass cap, the jar finish, the gasket and the glass capped package.

The All-Glass Cap

The side seal glass cap requires a good commercial quality of manufacture equal to standard practical jar finish manufacturing quality. Hartford specifies manufacturing limits equivalent to the G. C. A. limits that are standard for corresponding jar finishes. Any good commercial bottle glass may be used in the manufacture of this cap.

Press mold equipment can be designed and made by any establishment familiar with press operations and the specific pressing machine selected for manufacture. Cap drawings as furnished by Hartford indicate recommended junction of plunger, plunger plate and press mold so that possible seams are kept clear of pry off surfaces.

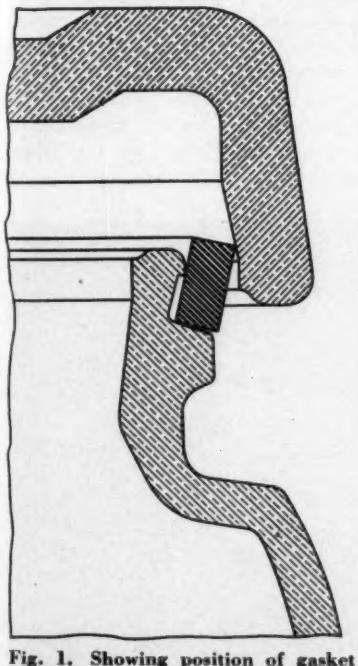


Fig. 1. Showing position of gasket on finish before the glass cap is pressed home.

Existing caps have been made on standard Hartford I. S. Machines with special press attachments furnished by Hartford. Any small automatic press should make these caps as readily as small cups or jars or ash trays or plates. The 63 mm side seal cap weighs 2 ounces. The liner machines which are designed to make the 70 mm Lightning jar lids at 3 ounces weight and liners for Mason jars at 1⅞ to 2¼ ounce weight can make the Hartford side seal glass cap. Hand presses can do an excellent job. Hartford feels that manufacturers will choose to use existing machines for making caps for the duration. A new cap pressing machine is being designed for possible postwar use.

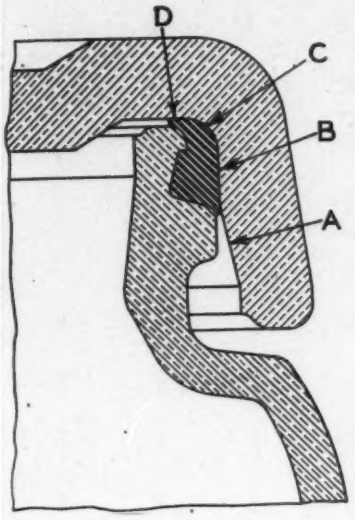


Fig. 2. Showing how gasket molds onto finish after glass cap is pressed home.

Initial trial and workout costs are varied and relatively high. Nevertheless, Hartford believes that increasing demands and use of glass caps will generate quantity production that will bring prices into line with metal caps in the larger sizes. For a rough estimate of reasonably efficient productivity, it is suggested that the 60 mm size should equal average metal costs, that larger sizes should be slightly less than metal and that smaller sizes will cost more than metal.

There are no royalty charges on any glass caps made with existing Hartford machinery.

The Hartford Side Seal Finish

The Hartford side seal finish is designed to apply on G.C.A. recommended and W.P.B. approved standard neck diameters. The design is obviously simple and easy to manufacture in any standard Press & Blow Forming Machine of the proper size for the required jar. The design is engineered to accommodate good neck ring and mold construction and use for maximum production with minimum repair. It can be made in the Lynch JP type of machines which blow through the neck ring or in the I. S. type of machines which transfer out of the neck ring before blowing the jar to final form.

Costs are no more and no less than with existing standard finishes.

Gaskets

Chemists, Physicists and Engineers have struggled long hours for many months to make or find gasket materials that could be used in place of rubber. Substitutes so far developed are generally lacking in "recovery" at processing temperatures and consequently tend to mold and flow during processing. Hartford has developed and is continuing to develop testing techniques for evaluating gasket materials by other than the usual test specifications for rubber.

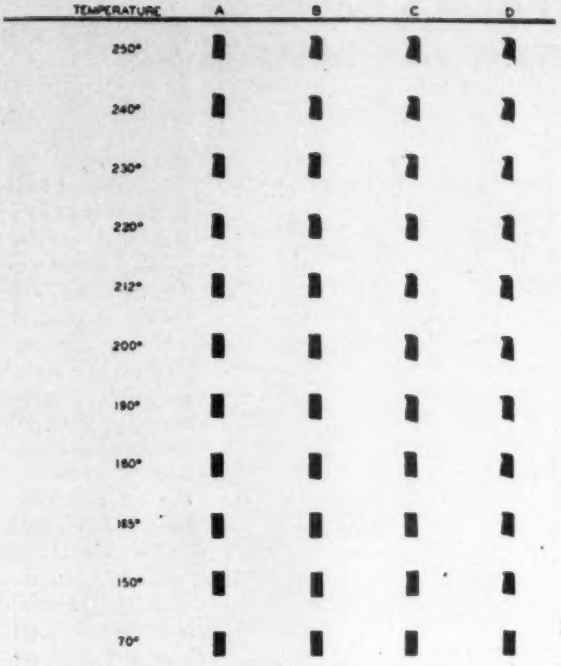


Fig. 3. Molding and flowing characteristics of gaskets.

Results of one simple test are shown in Fig. 3 which is a charted visual comparison of molding and flowing characteristics of three substitutes with one synthetic rubber sample. This chart is a photograph of sections of actual gaskets, each of which was cut from a gasket which had been applied to and processed on a jar under controlled conditions. One can readily discern varying degrees of recovery and of set or molding. A considerable degree of flow is seen in the sharp tails which are extruded between cap and finish as in Sample "D" at 250°. By contrast note Sample "A" (Buna S) which shows slight molding but no flow. The purely academic statement could be made that samples "B," "C" and "D" are not equal to rubber. Hartford, however, finds that all are useful when properly applied.

This gasket study is offered as an indication of the attention to detail that is essential to sound recommendations on gaskets and their use. Hartford can recommend any of the material types indicated in Fig. 3 for use in their all glass side seal package. It is essential, however, that safe specifications be established and followed relative to: (1) glass and gasket dimensions (manufacturing limits), (2) filling (temperature and head space), (3) capping (initial vacuum), (4) processing (safe overpressures at cooking temperatures), (5) product to be packed.

Gasket costs vary somewhat. Generally speaking the substitute materials range both above and below natural rubber costs. It seems that a substantial part of the gasket cost is in the fabrication. Hartford side seal gaskets weigh about 40% more than standard metal cap side seal gaskets of the same nominal size. This means fewer gaskets per pound of material but not necessarily higher costs per thousand gaskets. The dimensions specified by Hartford establish an essential minimum weight for each size in each material, based on a safe minimum percent compression.

The Glass Capped Package

Gaskets may be applied on the jar by hand at a rate of 40-45 per minute or automatically as fast as any single line can operate. Caps may be applied similarly by hand or automatically with either mechanical or steam vacuum equipment. A two inch vacuum is sufficient for capping and holding cap in place on cold gaskets for handling and shipping. Higher vacua are essential for high temperature processing and to maintain secure vertical pressing action on moldable gasket materials.

One pound jars with 60 mm glass caps at 20 inch vacuum and with very moldable gaskets (Fig. 3 Type "D") have gone through shipping tests severe enough to break some jars without showing any indication of caps breaking or loosening.

Pry off resistance is controllable with due consideration for gasket fitting and final vacuum. For instance, the combination of a 29 inch vacuum on an oversized type "A" gasket may provide a 50-pound pry off resistance while a 2 inch vacuum on a loose fitting type "D" gasket may provide an easy finger pry off. A workable example of processed foods is a 20 inch vacuum on gaskets dimensioned for 30% minimum gasket compression; resulting in approximately 25 lb. pry off resistance on a 60 mm cap. Caps so applied are readily removed by pry off with a spoon handle or house key or similar implement. Hartford caps do not break during removal against maximum pry off resistance obtainable with full vacuum and type "A" gaskets.

Gaskets are not injured by prying off caps. Most gaskets come off with the cap. By replacing the gasket on the jar, the housewife can have a very convenient reseal package. Home vacuum seal is attainable with the aid of the family teakettle.

Hartford is offering the design of this new glass closure freely to the industry as a contribution to the war effort and to advance the use of glass containers.

16 oz. and 28 oz. glass capped jars.

General view of the Libbey Glass Company's blowing rooms where machine made tableware is produced.

Thousands of Libbey glass tumblers coming off the annealing lehr ready for packing to be shipped away.

GLASSWARE INDUSTRY VERSATILITY PROVED*

By EDWARD J. DETGEN

Division of Industrial Economy, Bureau of Foreign and Domestic Commerce

Producers of utility glassware are operating day and night to fulfill the military and essential civilian requirements for their regular products and to supply the new wartime articles, the latter necessitating conversion of their facilities. The people in this industry are under unusual pressure because the essentiality of their operations is not generally understood.

Glass performs its war service without detracting from the supply of war-essential materials. There is a plentiful supply, universally available, of the principal raw materials—sand, lime, and soda ash—used in making most types of glass. With modern, high-speed machine methods, the industry enjoys a large volume of production per man-hour unit expended, as relatively little labor is required to produce great quantities of glassware.

Tremendous Demand

In addition to the utility glassware industry's wartime advantage through use of a minimum of critical materials, it is also fortunate in having customarily employed a large percentage of women—of the estimated 12,000 persons employed in 1941, about 30 per cent were women. Owing to wartime manpower problems, this percentage has increased substantially so that today between 40 and 50 per cent are women. In some plants women are working even in the hot furnace rooms. Therefore, if this industry can maintain its key male craftsmen it should be able to continue to supply essential civilian and military articles.

Our need for utility glassware—tumblers, tableware, kitchen and cooking ware—has increased tremendously with the war. Americans engaged in the myriad phases of winning the war are eating away from home in new surroundings where large quantities of glass are required in the preparation, cooking, preservation, and serving of food and beverages. An incident illustrating the greatly expanded need occurred recently when a customer's order was returned by the manufacturer with the notation that only normal requirements could be met. It developed, however, that the unusually large order was for glassware needed to serve thousands of servicemen in transit to their various destinations. The order is being filled.

Replacement Market

Important to consider in any discussion of utility glassware during wartime is the large volume of household articles in common, everyday use which must be replaced continually. Exact figures are not available but it is well known that a large proportion of the industry's annual output of over a billion utility glassware articles is essential equipment and appliances for America's 35 million homes. Denied its normal supply of a large number of utensils, equipment, and appliances made of

* Reprinted from July issue of "Domestic Commerce," the official publication of the U. S. Dept. of Commerce.

critical materials, the American home has turned to utility glassware to carry on.

The tendency in consideration of glassware is to think first of tumblers, sparkling clear and sanitary, performing a very definite service in the hospital, home, hotel, railroad dining car and restaurant. Less in the public eye is the increased use of kitchen glassware—one manufacturer reports a 500 per cent increase in his output of mixing bowls, fruit reamers, measuring cups, and storage dishes for refrigerators. Heat-resisting glass cooking utensils and ovenware, as well as glass coffee pots and teapots, are doing their best to supply the essential requirements of civilian economy now that most metal utensils have been converted to war. This glass cooking utensil production is still a small fraction of the total cooking utensil needs and should be maintained to insure proper food preparation for war workers.

Essentially Small Business

Further, the production of utility glassware is closely related to the small business problem, which is receiving so much attention these days in governmental and business circles. This relationship arises from the fact that a large proportion of the utility glassware production of the utility glassware production is distributed through wholesalers and retailers—a leading producer of cooking ware estimates that 90 per cent of his output is so distributed—and these are generally classified as small business.

To provide increased production for essential uses, the manufacture of utility glassware has been streamlined and simplified. In addition to standardization of sizes and shapes and styles, the less essential decorative ware and novelties are stepping aside to make room for increased production of the glassware needs of the day. Instead of the variety formerly available, a large volume of fewer styles will be serving the armed forces, hospitals, hotels, restaurants, the home front, and new in-plant feeding facilities. Eating facilities close to the job are important to the health, morale, and production capacity of the thousands of workers in plants engaged in war production. There are reported to be 22,000 war plants, many of them working three shifts and located a distance from eating places, in which food-serving facilities have not yet been installed. It will take a lot of utility glassware to fill this need.

Glassmaking skill and equipment have enabled Corning Glass Works to meet today's diversified demand for glass. Illustrated are two large electronic tubes, extra-tough glass messware for use in Army camps and two insulating coil forms and a coil end plate of Multiform glass for radios.

War Products Designed

Manufacturers have curtailed the introduction of new products that would require metal for new molds and valuable man-hours for the necessary operating changes. Some plants are replacing discontinued lines with kitchenware—cooking utensils, roasting pans, casseroles, refrigerator dishes, canister sets. Several have shifted from tumblers to glass preserving jars, anticipating increased demand from home canners. Utility glassware manufacturers are also making such essential items as chicken founts and latex cups. The type of oil lamps customarily found on farms and the kind of lantern globes used on railroads and construction jobs are now making an appearance in out-of-the-way military posts throughout the world. In addition to use by the military they are serving as a token of good will from fighting Americans to friendly natives. It is easy to imagine a native's pride in the possession of a glass lamp, decorated with an American flag. Two million of these were reportedly shipped to Africa early in that campaign.

On the war production front, many of the utility glassware industry's production facilities and personnel have

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A tumbler blowing machine and lehr in the Libbey plant in Toledo, Ohio.

Inspection of bowls in the Anchor-Hocking plant in Lancaster, Ohio.

ACCIDENT PREVENTION FILM HELPS CONSERVE MANPOWER

Think Safety in the Plant and Away From It Is Theme of Motion Picture Made Available to Glass Industry

By LYNE S. METCALFE

Editor's Note: The motion picture described in this article was originally produced for one of the largest manufacturers in the automotive industry. As a contribution to the war effort, certain training films such as this one are being made available to the glass industry at a nominal figure through various war training film agencies. The Glass Industry will gladly supply full details to interested glass companies.

Figures show that, next to ordinary illness, physical accidents to workers in glass plants and factories take the greatest toll in absenteeism, loss of man hours—a direct influence on the rate of production in needed war materials.

When it is considered that in 1942 47,500 industrial workers were killed in preventable accidents (18,500 on the job and 29,000 off the job) and that 93,000 Americans were killed and 9,300,000 were injured by preventable accidents in the same period, it will be seen that any measures which may tend to reduce this rate should be taken seriously by the glass industry.

Safety education programs, paralleling safety precautions measures thrown around workers in the glass industry, are comparable to the best in American industry generally, but wartime "speed-up" conditions naturally tend to increase the rate of accidents and degree of seriousness (in terms of man hour loss) in spite of this.

The best experience in safety education agree that the most important factor in reducing accidents in an industry such as glass is to get every employe "*thinking* safety" every hour of every day. It matters very little whether the glass plant employe suffers an accident on his way to work, in his own backyard, or in the plant itself, absenteeism which may result is just as wasteful to the war effort, to the employer and to the worker himself. Hence, wartime safety education programs now do not stop at making the employe "think safety" on plant property but in his home and on his way to and from work as well.

Recently, there has been made available to the glass industry two sound motion pictures (in 16 mm.), each of which deals with one phase of this type of safety education. They are:

"Factory Safety"—designed to make glass plant employes *think safety* at all times—on the job.

"A Safe Day"—the purpose of which is to inspire the worker to *think safety* going to and from work, and at home as well.

The films are not, in themselves, a "course" in safety training. They supplement and augment any safety program the glass plant may now have in use. They do not aim to give the worker a step by step procedure of the many and varied safety rules which prevail in the industry, but they do highspot the basic principles of safe conduct at home, enroute to and from work, and on the job itself.

They are inspirational in character, are interesting, free from "horror" angles which have so often reduced the effectiveness of safety films in the past, and each film has a running time of approximately eleven minutes.

Now, as to the pictures themselves.

"Factory Safety" shows some of the basic principles of safety rules in the modern plant. Some of the best known safety equipment and precautionary methods are

(*Continued on page* 313)

John Jones knows that an accident at home is as bad as an accident at the work bench and acts accordingly (From "A Safe Day").

John Jones knows that unlocked switches are too easy for some one to accidentally turn on (From "A Safe Day").

CALCULATION OF DENSITY

IN THE field of practical glass technology the calculation of the density of glass from its composition serves many useful purposes. Accordingly numerous attempts have been made over a period of years to develop factors and mathematical procedures that would result in the accurate calculation of this property. In a recent paper, Huggins and Sun [1] have discussed the calculation of density and certain optical constants of glasses from their composition in weight percentage and have developed various equations and numerical data.

The density calculations as outlined by Huggins and Sun offer such interesting possibilities that it seemed worthwhile to reproduce, in a condensed and illustrated form, their methods and the tables of constants that are used in their equations. The original table of constants contained many unusual glass components which made it rather difficult to use in the case of ordinary glass compositions. This table has been condensed for the sake of convenience.

The Calculation of Density

Method A: 1. If the composition is given in weight percentages of the oxide components (the usual method of expressing composition), divide each such percentage by 100 to obtain the corresponding weight fraction, f_m. For example, 70 per cent SiO_2 becomes 0.7000 fraction SiO_2.

2. Multiply each f_m by its corresponding sm value as given in Table I, and add all of these products together to obtain Σsmfm. For example:

	f_M		S_M	
SiO_2	.7000	×	.033300	= .02331
CaO	.1000	×	.017832	= .00178
Na_2O	.2000	×	.016131	= .00323
			Σsmfm	= .02832

3. Compute Nsi by use of the following equation:

$$Nsi = \frac{fs:}{60.06\ \Sigma\ smfm} \qquad (1)$$

Using the data given in the above example this calculation is as follows:

$$Nsi = \frac{.7000}{60.06 \times .02832}$$

$$Nsi = 0.412$$

The Nsi value so obtained determines which column of v_m values in Table I is to be used in the next step (in the case of ordinary soda-lime-silica glass the Nsi value is usually between 0.40 and 0.435).

4. Each f_m figure is then multiplied by the appropriate v_m value (taken from Table I) and the products added together, obtaining the reciprocal of the density as given in the following equation:

$$\frac{1}{p} = \Sigma v_M f_M \qquad (2)$$

In the case of the data in the example this equation is calculated as follows:

	f_M	×	v_M	
SiO_2	.7000	×	.4409	= .30863
CaO	.1000	×	.231	= .02310
Na_2O	.2000	×	.324	= .06480
			$\Sigma v_M f_M$	= .39653

$$\frac{1}{p} = .39653$$

TABLE I

Huggins' Factors for Computing Density†

Component Oxide		VM		V¹M
MMON	$S_M \times 10^3$	Nsi = 0.345–0.40	Nsi = 0.40–0.435	Nsi = 0.435–0.50
SiO_2	3.330	.4281	.4409	.4542
Al_2O_3	2.9429	.418	.373	.294
Fe_2O_3	1.8785	.255	.225	.176
CaO	1.7832	.259	.231	.184
MgO	2.480	.360	.322	.256
Na_2O	1.6131	.349	.324	.281
K_2O	1.0617	.374	.357	.329
$B_2O_3(B^I)$	4.3079	.526	.460	.345
$B_2O_3(B^{II})$	4.3079	.727	.661	.546
BaO	0.65206	.132	.122	.104
ZnO	1.2288	.187	.168	.135
PbO	0.44801	.0955	.0926	.0807

TABLE II*

	Range of Nsi		
	0.345–0.40	0.40–0.435	0.435–0.50
bsi	4.21	2.66	0.00
v^1si	0.2875	0.3520	0.4539

5. The reciprocal of this result is then taken to obtain the density, for example:

$$\frac{1}{p} = .39653$$

$$p = 2{,}522$$

The above procedure is all that is necessary for determining by calculation the effect of composition on density such as is required when different glass compositions are to be compared. In the case of actual glasses, however, the degree of annealing influences the density and must be corrected for in the calculations as follows:

Method B: (This procedure is recommended by Huggins and Sun for those cases where it is believed that the perfection of annealing differs much for the glass in question from that for the glasses studied at the National Bureau of Standards.)

1. First estimate a value for K, the annealing constant. For perfect annealing, it should be zero; for less perfect annealing, than that of the Bureau of Standards, it should be greater than 0.01. (For example, the sodium silicate glasses studied at Sheffield averaged 0.05.

2. Compute $\Sigma s_M f_M$ and Nsi as in Method A.

3. Compute $\Sigma v^1{}_M f_M$, using the constants, $v^1{}_M$, from Table I; the value of Nsi determines which bsi and v^1si values (from Table II) are to be used.

4. Calculate 1/p by means of the following equation:

$$\frac{1}{p} = (k + bsi)\ \Sigma s_M f_M + \Sigma v^1{}_M f_M \qquad (3)$$

[1] Huggins and Sun, Jour. American Ceramic Society, 26,1,4-11,1943.

† Condensed from: Huggins and Sun, Journal American Ceramic Society, 26,1,1943,1-11.

* Condensed from Huggins and Sun (*ibid.*).

(*Continued on page* 310)

INVENTIONS AND INVENTORS

A Summary of U. S. Patents of Interest to the Glass Industry Issued During May

This article includes a discussion of some of the patent applications filed by foreign nationals and seized within recent weeks by the Alien Property Custodian. These may be distinguished by the letters APC preceding their numbers. Just as is the case with issued patents,* printed copies of these vested applications may be purchased from the Commissioner of Patents, Washington, D. C., for ten cents. In ordering them it is required only that the purchaser list the application numbers, preceding each with the letters APC.

Compositions

APC 423,037, the application of Hans Kohl of Frankfort, Germany, discloses the use of alkali meta-antimoniates as decolorizers and refining agents in glass melting.

Hans Steinbock of Dusseldorf-Gerresheim, Germany, reported in APC 284,099 that high resistance to heat, moisture and chemicals is inherent in glass fibers made of glass containing about 53.5% SiO_2, 7.5 to 13% B_2O_3, 5% Al_2O_3, 19% BaO, up to 10% alkalies, 2% ZnO, 5% MgO plus CaO, and small amounts of iron oxide and fluorine.

Edwin Berger and Otto Freundel of Jena, Germany, discuss in APC 395,364 the problem of producing fluorine alumino-borosilicate glasses having the optical characteristics of a low mean dispersion and a low refractive index. One operating principle is to keep the fluorides, alumina and titania as high as possible, depressing the magnesia, lime and boric oxide. The application gives optical data on 41 compositions varied in a systematic manner.

Feeding, Forming and Shaping

In patent 2,319,683 Victor E. Hofmann of Toledo (Owens-Illinois) describes a hand operated machine for uniting two halves of a bottle or jar molded separately from thermoplastic materials. The edges are placed together and rotated while they are ironed together by a heated roll outside the container, which presses against a back-up tool on the inside.

Two applications seized by the patent examiner concern foam glass. These are APC 306,501 applied for by Bernard Long of Paris, and 275,121 applied for by Bernard Weiner of Prague. Long brings about the gas evolution to produce cellularity by incorporating carbon and arsenic oxide in a charge of powdered glass. Using this oxide or any one of several others it is said that carbon serves as the reducing agent to cause the formation of CO_2 gas and a vapor of arsenic. Weiner describes a method of shaping foamed glass by air pressure extrusion from the container in which it is bloated.

APC 418,602 and 418,603 applied for by Jakob Dichter of Berlin-Schoneberg, Germany, constitute his latest additions to the art of making vials and other small glass articles. The first of these has to do with shaping the mouths of small bottles so as to provide a relatively wide bearing surface for the caps so that highly volatile contents can be more surely held without loss. The apparatus of APC 418,603 is designed for shaping glass tubing and to operate in conjunction with a multiple station machine such as the ampoule machine described in Dichter's earlier patent 1,962,985.

Karl Rudolph of Dresden, Germany, filed APC 383,370 for means of uniting two sections of a glass block. One of the halves is made with lugs which coincide with recesses in the other half, but in such a way that the two sections stand apart a uniform distance. The edges to be joined are then softened by flames, and pressure is applied to flatten the lugs and to complete the union.

Miscellaneous Processes

APC 314,727 filed by Alberto Quentin of Milan, Italy, describes a number of systems and devices for tempering such ware as containers and tumblers. Fig. 1 shows one of the cooling systems for applying an air blast to all surfaces of a tumbler.

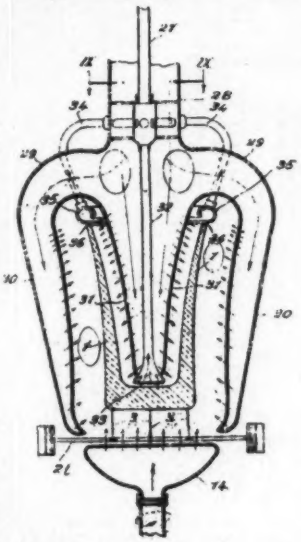


Fig. 1. APC 314,727: Quentin. Blowers of unique design for quickly cooling a tumbler of tempered glass.

APC 423,106, the application of Erich Mickley of Berlin - Zehlendorf, Germany, is concerned with means of completing seals between glass and metal, and particularly with closures having sealed-in conductors, for electric discharge tubes. Also concerned with the lamp art is patent 2,318,652 to Chas. Weiner of Newark, N. J. (Westinghouse) for methods of making lamp stems. S. H. Stupakoff and F. R. Prescott of Pittsburgh assigned their glass-to-metal seal patent 2,318,435 to Stupakoff Laboratories, Inc.

The latest Polaroid Corp. patent is 2,319,816 issued to Edwin H. Land for a glass element which differentially absorbs two perpendicular components of an incident beam of light throughout a predetermined wave length band, and which comprises glass having a metallic content which gives it the polarizing properties, the glass having been extended under stress in a range where it is stretchable.

Sidney S. Anderson of Hattiesburg, Miss., received patent 2,319,101 for a beverage bottle with a thermometer built into its side to indicate when the temperature of the drink is correct for imbibing.

*Glass Industry, March and May, 1943.

Sheet and Plate Glass

On the oscillating cooling frames of Fig. 2, taken from patent 2,318,584 granted to G. W. T. Bird of Prescot, England (American Securit Co.) for sheet tempering equipment, there are small hardwood pegs 11 which prevent damage to the sheet if it should be blown against the frames. The dotted lines show how the pegs can be withdrawn while the sheet is moved into position by the usual suspending tongs. The pegs oscillate with the cooling frames and are intended to touch the sheet only momentarily. Other tempering equipment is shown in APC 286,616 filed by Felix Vranken of Jemeppe-sur-Sambre, Belgium, which concerns means of conveying suspended sheets through the tempering furnace in such a way as to minimize heat loss through the slotted roof.

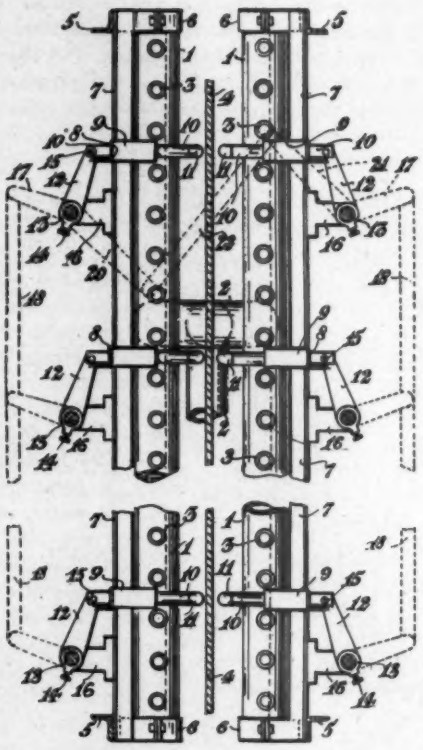


Fig. 2. 2,318,584: Bird. In applying air blasts to temper glass sheets wooden capped pegs 11, momentarily touch the sheet so it will not be blown against a cooling frame.

In patent 2,319,534 John C. Crowley of Cleveland Heights, Ohio, proposes means of making a continuous strip of laminated glass from previously inspected sheets. The principle is in part illustrated by Fig. 3 in which 21 and 22 are two stacks of glass sheets and 20 is a continuous sheet of plastic for the interlayer. Sheets from stack 22 are laid down on the conveyor with their edges abutting; the plastic sheet is laid on top and then sheets from stack 21, also with abutting edges, complete the sandwich. From this point the continuous but somewhat flexible strip is moved through units which provide pressure bonding, and then to grinding and polishing units, not shown by this illustration, which work on

Fig. 3. 2,319,534: Crowley. A continuous strip of laminated glass is made by laying down inspected sheet sections with abutting edges, two such layers being held together by a plastic sheet.

both sides of the strip simultaneously. The cutting operation to give laminated glass of the desired dimensions completes the operations.

APC 288,242 filed by Adolf Kampfer of Berlin, Germany, discloses laminated sheets using an exceptionally thick plastic layer, in fact equal to about 70% of the thickest glass covering sheet.

Means of producing continuous corrugated glass sheet is described by Louis Boudin of Saint-Gobain, France, in APC 333,410. Glass flowing horizontally through forming rolls is lead over a table which has a corrugated surface. To force the glass to take the form of the corrugations, freely rolling balls ride on top of the sheet above the valleys in the underlying table.

Bernhard Wempe of Berlin, Germany, describes in APC 125,892 and 382,311 a number of methods for producing a multitude of small holes in glass sheets. A product of such processes is a spinning nozzle used in the production of artificial silk. By one method Wempe pierces the sheets with a gang of heated spinning needles which recede into a metallic guide when they are withdrawn from the glass, this serving to strip them of adhering glass. By the process of 125,892 one glass sheet is laid in a mold, carefully spaced platinum wires are placed on top, another glass sheet covers the wires, and then heat and pressure are applied. The product with embedded wires is cooled and sliced perpendicular to the wires, and finally the wires are removed by acid etching to leave the holes.

Patent 2,319,857 issued to David E. Gray of Corning, N. Y. (Corning Glass Works) describes a roof structure made of tiles of special design.

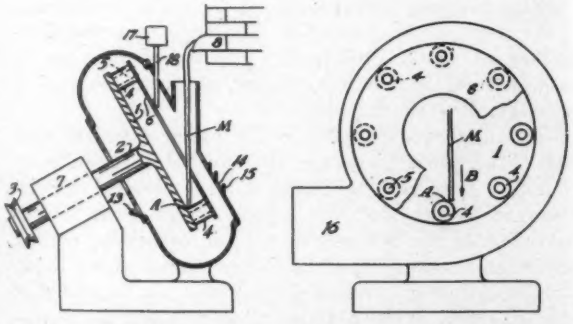


Fig. 4. 2,318,821: Wallrath and Basinski. A high speed rotor for forming shot-free fibers.

Glass Wool and Fiber

Patents granted to Owens-Corning Fiberglas Co. included 2,318,821 to Burton Wallrath and Leonard

(*Continued on page* 315)

Research Digest

Practical Interpretations of Glass Technology

Study of Photoluminescence in Glass

As studies on the fluorescence of glass are of interest both from the theoretical and practical viewpoints, Rodriguez, Parmelee and Badger (Journal American Ceramic Society, May, 1943) have investigated the influence of composition and temperature on the fluorescence of a series of glasses containing elements such as uranium, cuprous oxide and tannous oxide. Their conclusions in regards to the influence of compositions are as follows: Secondary cations reduce the fluorescence of uranium in the glasses studied depending to a certain extent on the electrostatic conditions they produce in the glass structure. The intensity of fluorescence as well as the structure of the spectrum diminishes in the order of phosphate, silicate, and borate glasses of equivalent compositions, which shows that fluorescence is favored by increase of oxygen in the glass structure without increasing the interfering secondary cations. In the case of glasses containing cuprous oxide and stannous oxide as activators, the fluorescence is favored by increase in lime and increases in silica. These glasses also possess appreciable phosphorescence which is enhanced by increase in silica and decrease in lime.

With uranium containing glasses the intensity of the fluorescence as well as the structure of the spectruce is greatly diminished as the temperature is raised over the range of —130° to 124°C. In the case of the copper-tin glasses the intensity of emission increases with temperature and reaches a maximum at about 86°C. and then decreases as the temperature is increased.

Behavior of Glazing Material Subjected to Explosion

Those members of the Glass Division who attended the Absecon meeting in the fall of 1942 will remember the excellent motion picture dealing with the effects of blast on glazing materials that was presented by the Pittsburgh Plate Glass Company. In the A.S.T.M. Bulletin for May 1943, Dr. F. W. Adams presents a written presentation of these studies illustrated by stills taken from the motion picture. In view of the importance of this subject at the present time the various data on the force required to cause damage to various glazing materials given in the paper has been collected and is given below in tabular form.

The data was collected by the following procedure: a small frame house was erected and provided with a suitable window opening for the test pieces. Charges of dynamite were then detonated at specified distances from the front of the window and the effect recorded by the means of a slow motion camera. To assist a more ready visualization of the results, they were presented on the basis of the equivalent distance at which a 500 lb. demolition bomb, containing 250 lbs. of high explosive, would have the same explosive force.

Effect of Blast on Glazing Materials

Type of Material	Remarks	Equivalent 500 lb. Bomb, Distance, ft.
Window glass, single strength	Broke at	1900
Window glass, double strength	Broke at	1200
Plate glass	Broke at	400
Wire glass, large sizes	Cracked at	1200
Wire glass, 12 x 18 in.	Cracked at	300-400
Wire glass, all sizes	Complete failure at	250
Tempered plate, 48 x 84 in.	Broke at	220
Tempered plate, 12 x 18 in.	Unbroken at	95
Laminated safety	Cracked at	400
	Complete failure at	170
Special laminated safety, double thickness	Cracked at	400
	Complete failure at	170
Special laminated safety, tempered plate, plastic and annealed plate	Cracked at	280
	Complete failure at	130
Special laminated, Flexseal type, annealed or tempered	Cracked at	550
	No damage at	145
	No complete failure at	95
Glass blocks	May be safe at	260
Plastic ⅛" clip or stop glazed	Broke at	700
Plastic 3/16" stop glazed	Broke at	220
Plastic ¼" clip glazed	Broke at	275
Plastic ¼" stop glazed	Broke at	180
Plywood ¼"	Blown out at	300-800
Masonite ⅛"	Blown out at	300-800
Masonite ¼"	Not broken at	300
Transite ⅛"	Broken at	500-800
Transite ¼"	Blown out at	600
Transite ¼"	Broken at	400

The Use of Suspended Roofs and Walls in Glass Furnaces

As far as furnace technology is concerned the steel industry has been much more progressive than the glass industry. This is especially true in the case of furnace design and improvements. The recent paper by Longenecker (Journal American Ceramic Society, May 1943) should therefore be of special interest to the glasshouse furnace engineer and furnace designer.

Longenecker discusses the constructional advantages and limitations of both the spring-type tank crown and the suspended or hung roof or crown. The use of the hung roof in both the steel industry and the glass industry is illustrated and described. It is shown that while the hung roof, which requires special shaped tile, tile hangers, and a supporting steel frame, will cost more for its initial installation than the conventional type crown the additional cost may be justified when it is considered that the hunf roof serves the double purpose of a roof inclosure and a means of heat control.

H. G. HUHN PROMOTED AT L-O-F

H. G. Huhn, formerly industrial sales manager of the Chicago district of Libbey-Owens-Ford Glass Company, has been appointed general traffic manager for the company. He has been associated with Libbey-Owens-Ford in many capacities for 14 years.

NITER BANNED FOR USE IN GLASS MAKING

Manufacturers of glass received a letter from the War Production Board recently which stated that from June 30 no sodium nitrate or potassium nitrate will be allocated for use in making any type of glass and glassware melted in continuous tank furnaces and formed on automatic machines. Niter can be used, however, in a continuous tank provided the glass produced by the tank is not formed on an automatic machine. The letter further states that these chemicals will be allocated for borosilicate types of glass and glassware.

In reference to this niter situation THE GLASS INDUSTRY published in the June issue an article by Dr. S. R. Scholes entitled "Nitrates in Glass Batches," in which he shows the most economical way to use niter in glass making.

WPB WARNS OF COBALT SCARCITY

Cobalt can now be secured for coloring glass if applied for on the 20th day of each preceding month on forms PD-581 and 582 as stated in the General Preference Order M-39 as amended March 9. Twenty-five pounds or less per month of contained cobalt metal in any form can be secured without the use of the forms.

However, the WPB is advising manufacturers not to make commitments too far in advance for delivery of glass which requires large amounts of cobalt necessary for coloring as the current availability of cobalt may change if the armed forces should require exceptional deliveries at some future time.

POTASH BAN LIFTED

In a recent order by Secretary Harold L. Ickes an 8-year-old limitation on the development of new sources of potash was lifted and an increased supply of potash to help meet war-time demands for agricultural and manufacturing purposes was assured. The market situation which had led to the issuance of the original order does not now exist since practically no potash now is imported.

CMP FORMS EXPLAINED

The Control Materials Plan is now in full authority over priorities since the expiring of the Production Requirements Plan on June 30. The Glass Industry has been able to secure the following information concerning the use of the various forms.

Form PD-1a is to be used when capital equipment is needed, and all such forms must be sent to the regional or district WPB office in which your plant is located. Equipment should be requested under the following classifications: (1) laminated and safety glass; (2) optical and technical glass; (3) structural glass; (4) ornamental and novelty glass; (5) table and kitchenware; (6) all other glass except containers; and (7) containers.

Form PD-200 is to be used when new structures are to be built. This form should be sent directly to the War Production Board, Washington, D. C.

PD-870 is a new form which is used for material which becomes a part of the manufactured product, not maintenance, repair and supply items. These also should be sent to the WPB in Washington.

L-O-F GIVES PREVIEW OF KITCHEN OF TOMORROW

The housewife's future dream kitchen was shown at a preview in Toledo, Ohio, by the Libbey-Owens-Ford Glass Company, on Tuesday, June 29. This streamlined postwar kitchen was designed by H. Creston Doner, chief of the glass company's department of design, who utilized glass whenever possible.

L-O-F has created a kitchen that combines utility for the preparation of food and livability as an extra room for study, games, or buffet bar. All equipment used for the preparation and cooking of foodstuffs is so designed as to allow it to be closed when not in use. The natural wood finishes on all cabinets harmonizes with other furniture in the house.

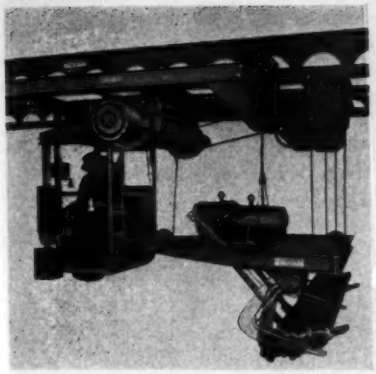
Bending and stooping is practically eliminated by hanging all cabinets and fixtures from the wall at proper working level. Ample foot space beneath the cabinets permits the housewife to do 75 per cent of her work sitting down.

New kitchen equipment has been created by Mr. Doner that is radically different from anything that has been seen before. The cooking unit is designed for compact, highly efficient performance. The cover lifts up and slides back with the under-surface lined with Vitrolite glass which serves as the splash panel. All cooking utensils are built in a single line across the rear of the unit. The glass lined cover, when closed, acts as an insulating agent and converts the whole stove into a fireless cooker. The toaster, electric waffle iron and grill and the electric mixer are all built in and permanently attached for immediate service.

The sink, dish washer, and refrigerator are all built in and have vitrolite lined covers. The wall storage cabinet has a translucent glass panel at the top allowing indirect lighting above to illuminate the interior. Sliding fluted glass doors make bumped heads impossible and make an interesting pattern without being entirely transparent.

An outstanding departure from conventional cooking equipment is the combination oven-griddle-barbecue which is covered by a steamtable-like hood of heat-tempered glass which seals heat inside but permits a full view of cooking operations. The bent white Vitrolux glass dome in the back of the oven serves as a translucent lighting panel which illuminates the entire interior of the oven.

NEW EQUIPMENT AND SUPPLIES

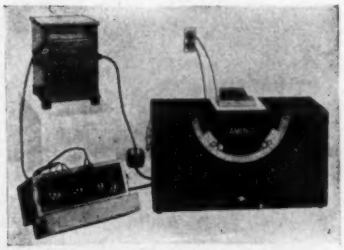


NEW MOTOR-DRIVEN CARRIER

A new motor-driven pipe and rod carrier which permits the cab operator to pick up 1500 lbs. of stock in 12-foot lengths from the storage room, transport and set it in racks at fabricating machines without any floor man, has been developed by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Company.

Since the unit travels overhead its use eliminates the need of aisles and makes possible the saving of considerable floor area. Also an outstanding feature of this equipment is the safety with which loads can be swiftly moved above machines and men. Materials transported need not be in balance nor is it necessary for the operator to spend time in locating the center of gravity of the load.

Similar carriers can be supplied for loads of heavier capacity and materials of other lengths.

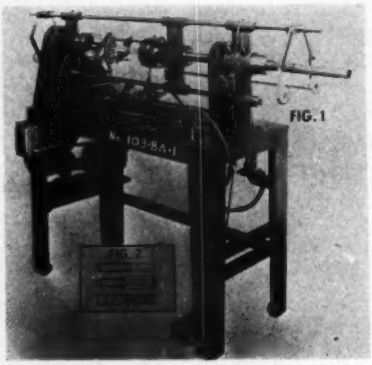


INSTRUMENT FOR MEASURING GLOSS

High, medium and low gloss of plane surfaces of materials over 2⅛x3 inches in size can be measured by a new Aminco-Scott Gloss-meter manufactured by the American Instrument Company, Silver Spring, Maryland. Measurements can be made on paint finishes, enamels, lacquers, metals, wood, paper, plastics, glass, etc. Results are in terms of the I.C.I. Normal Observer and I.C.I. Illuminant C.

The kinds of gloss measured with this instrument are specular gloss, contrast gloss, distinctness-of-image gloss, absence-of-bloom gloss, and many other optical properties of surfaces of all kinds. It is especially useful for A.S.T.M. method D523 for measuring specular gloss of paint finishes.

Some suggested supplementary uses are the measurement of the hiding power of deposited finishes, cleansing power of soaps and detergents, relative apparent reflectance of plane surfaces for obtaining Munsell value, index of refraction, resistance of surfaces to abrasion, weathering, wear, etc.



MACHINE MAKES ELECTRONIC TUBES

Small and medium sized electronic tubes and various cylindrical glasswork can be produced on a new machine put out by the Eisler Engineering Company of Newark, N. J. All required operations such as butt-sealing, sealing of glass to metal, glass blowing, piercing, shaping and constricting can be performed by the one machine.

The machine has a hollow, perfect co-axial aligned spindle, one stationary and one movable chuck and is adequately supplied with fires of circular shape, mounted on a carriage, which can be moved either length or crosswise by means of handwheels.

TRANSCORD BREAKER FOR CONVEYOR BELTING

The Transcord Breaker used in constructing conveyor belting has just been announced by the B. F. Goodrich Company. Its main feature is that the breaker cords are placed across the belt width, rather than parallel with the cords of the belt itself.

The Transcord Breaker also provides much greater adhesion between cover and carcass than the regular breaker construction. It tends to stop most cuts and gouges before they penetrate to the belt carcass and the construction prevents distortion of the rubber cover beyond its elastic limit because of severe impact.

CATALOGS RECEIVED

The Jeffrey Manufacturing Company, Columbus, Ohio. Catalog No. 750 consisting of 176 pages covers the complete line of Jeffrey-Traylor electric vibrating equipment for material handling and processing operations.

The Brown Instrument Company, Philadelphia, Pa. This new bulletin entitled, "Brown New-Matic Time-Pattern Controller," describes in detail the operating principles of this two-unit controller. The text is illustrated with diagrams and photographs of installations.

The Detroit Universal Duplicator Co., Detroit, Michigan. "What Is Duplimatic and How Does It Work?" is the title of a 16-page, 2-color broadside put out by this company which shows how the Duplimatic provides automatic control to put milling, turning, boring, shaping, die-sinking and similar operations on a high speed production basis.

William R. Harshe Company, Chicago, Illinois. A new issue of this company's condensed catalog, Bulletin No. Z6200 has been published giving current prices and short descriptions of all Wheelco instruments.

American Manganese Steel Company, Chicago Heights, Illinois. A 480-page bulletin covering the uses of Manganese steel in many industries, including glass, has been published by this company. The theme of the booklet is to help industry to "carry on" behind the lines.

Tite Flex Metal Hose Company, Newark, N. J. A new catalog has just been released by this company which deals with the general industrial applications of their line of flexible metallic tubing. Included in the booklet are complete pressure charts, charts showing radius of bend, and much other essential data.

CATALOG & BULLETIN SERVICE

Current catalogs and manufacturers' service bulletins reviewed in this department may be obtained by writing to THE GLASS INDUSTRY.

GLASSWARE ADVISORY COMMITTEE HOLDS FIRST MEETING

The Kitchen and Table Glassware Industry Advisory Committee has had its first meeting in Washington with representatives of the War Production Board. John R. Hostetter, chief of the Glass Unit, Chemical Division, was in charge of the meeting as Government Presiding Officer. Wartime problems of labor supply, shipping containers, and raw materials were discussed by members of the committee.

They expressed the hope that the conversion to the more essential production of cathode tubes, radar bulbs, chemical ware, aircraft parts and blackout lenses would put the industry in a more favorable position with respect to the manpower problem. According to the industry members approximately 40 to 50 per cent of their labor are women and one member stated that the employment of older and handicapped persons had helped to stabilize their labor force, lessening the number of workers subject to military service. Absenteeism has been studied and remedied by many plants, and additional personnel have been secured for this purpose.

The availability of corrugated shipping containers has effected glassware production to such an extent that several plants were reported to have been forced to halt production from time to time until containers were secured. The committee stated that an increase in glassware production could be expected if more containers were made available.

Provisions of Order P-140 were explained by a representative of the Wooden Containers Section, WPB. Prior to the issuing of P-140 many orders rated AA-1 were being received by container manufacturers. These were issued on directives, P orders and by other authority. Order P-140, he said, was intended to effect consistency by rating the use of containers by the various industries, but it did not, however, cover all products. It has been suggested, he further stated, that containers be classed as production supplies rather than operating supplies. An objection to their classification as operating supplies is that higher rated industries might obtain all available stocks.

The use of sodium nitrate in glassmaking should be reduced as much as possible without retarding production, warned a representative of the Nitrogen Unit, WPB. The shortage of shipping space from Chile, principal source of supply of sodium nitrate, makes importation of this batch constituent undependable. Therefore, conservation of this important chemical in industrial use is extremely desirable.

Since sodium nitrate acts as an oxidizing agent in the glass batch and prevents the formation of "seeds" and "stones," some committee members believe that the use of natural gas could eliminate this chemical as a glass batch ingredient. One member stated that he had reduced sodium nitrate consumption from 11 to 5 pounds for a 2,200-pound batch by using natural gas. However, he did not believe proper results could be obtained with the same formula when producer gas is used for firing.

The committee suggested that the industry requirements for metal for use in cooking ware be entered on the metals program for the third and fourth quarter. The industry is permitted metal up to 7½ per cent of the weight of cooking ware.

LARGEST PRISM MADE BY BAUSCH & LOMB

An optical glass disc weighing 260 pounds and said to be the largest prism ever made was recently cast at the Bausch & Lomb Optical Company for use in the Burrell telescope at the Warner & Swasey Observatory of the Case School of Applied Science, Cleveland, Ohio. This disc measures twenty-six inches in diameter and is graduated in thickness from one and one-half inches to three and one-quarter inches.

The huge lump of optical glass was molded to shape in a "drop" furnace utilizing a pot designed to produce a wedge type disc. The two flat surfaces were polished for examination of the disc with polarized light to detect strain which causes double refraction of light. One of the most perfect pieces ever produced, this chunk of glass was made absolutely free from imperfections, a rarity with such a large piece.

A few plants have cast large optical glass parts successfully and some of them have made large elements for mirrors from which light is reflected. This prism is for transmitted light, and has a refractive index of 1.617 and a dispersion ratio of 36.6.

One of the best telescopes in the world for direct vision, the Burrell telescope is expected to aid in the analysis of star light by means of photography. The Bausch & Lomb prism will be used in conjunction with a correction plate to separate light from the stars into spectrum lines by means of which astronomers determine the nature of the radiations, surface temperatures, stellar motion and velocity, and the mass and density of stars.

GOVERNMENT PUBLICATIONS AVAILABLE

Recent publications from Washington which may be of interest to glass manufacturers are:

"Spreading the Work"—Discussion of the Smaller War Plants Corporation, the role of the prime contractor and sub-contractor. Copies may be secured free of charge from the Smaller War Plant Corporation, Washington, D. C.

"Safety Speeds Production—A Message for Supervisors"—U. S. Department of Labor, Division of Labor Standards, Washington, D. C. Bulletin No. 10.

"Choosing Women for War-Industry Jobs"—A bulletin (No. 12) of the Women's Bureau. Superintendent of Documents U. S. Government Printing Office, Washington, D. C. 5 cents a copy.

DERBYSHIRE APPOINTED TO STAFF AT BATTELLE INSTITUTE

Stephen W. Derbyshire, ceramist, has been appointed to the technical staff of Battelle Memorial Institute, Columbus, Ohio, where he will be associated with its division of ceramic research.

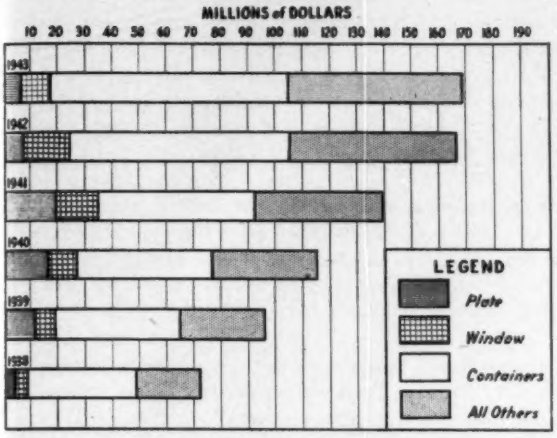
Mr. Derbyshire, was formerly associated with the Mexico Refractories Company, Mexico, Missouri, and holds the degree of Bachelor of Science in ceramic engineering from the University of North Carolina. He is a member of the American Ceramic Society and Keramos.

• Madison Square Garden has been chosen as the new location for the 19th Exposition of Chemical Industries which has been definitely set for the week of December 6th to 11th, 1943.

CURRENT STATISTICAL POSITION OF GLASS

THE GLASS INDUSTRY'S INDEX

Production: Four Months, January Through April



During April glass production remained at the same high level established in March, with employment and payrolls maintaining their previous rates. According to The Glass Industry's Production Index, glass output during April amounted to approximately $43,000,000, the same level as March 1943 and April 1942. During the first four months of 1943 glass production totalled $169,000,000 as compared to $167,000,000 in last year's comparable period.

Plate glass production during May amounted to 5,855,169 square feet compared to 5,488,176 square feet produced in the preceding month, a 6 per cent increase. This also showed an increase of 36 per cent over last year's comparable month. During the first 5 months of this year plate glass production totalled 26,265,266 square feet, 12 per cent under last year's level.

Window glass production during May dropped 6 per cent from last month's figure to 942,403 boxes, which represented 58.1 per cent of the industry's rated capacity. As compared with this, May 1942 production was 1,557,135 boxes. During the first five months of 1943 this output was 5,474,968 boxes as compared to 7,879,000 boxes in 1942—a 30 per cent decrease.

Glass container production during May totalled 8,103,600 gross, according to the Glass Container Association of America. This was a 6 per cent increase over the previous month and a gain of 12 per cent over May 1942. During the first 5 months of 1943 glass container production reached the record total of 37,319,899 gross which was an increase of 10 per cent over 1942.

Shipments of glass containers during May were reported at 8,358,905 gross, or 19 per cent more than last year's corresponding month. This trend was not prevalent in all lines, for beer bottles dropped 30 per cent, milk bottles 25 per cent, pressed food ware 14 per cent and liquor ware 3 per cent. These declines were offset by increases of 378 per cent in domestic fruit jars, 70 per cent for domestic jelly glasses, 55 per cent for general purpose ware, 49 per cent for wide mouth food bottles and jars and 42 per cent for narrow neck food containers. Total shipments for the first 5 months of 1943 amounted to 38,950,559 gross or a gain of 18 per cent over last year. Increases were reported for all lines over last year's comparable period with the exception of pressed food ware, liquor ware and milk bottles. Largest gains were achieved in domestic fruit jars (up 263 per cent), general purpose ware (up 42 per cent), wide mouth food bottles (up 42 per cent), and jelly glasses (up 16 per cent). Other increases were seen in beer bottles, 9 per cent; medicinal and toilet ware, 5 per cent; and pressure and non-pressure ware, 2 per cent.

Inventories of glass containers as of May 31, 1943, totalled 5,582,836 gross—a 41 per cent decline over last year's level. Decreases were reported for all lines.

Automatic tumbler production during May amounted to 4,929,464 dozens—19 per cent increase over last year's comparable month. During the January-May period this output showed a decline of 5 per cent from 1942's comparable months to 22,104,754 dozens. Shipments of

CURRENT GLASS CONTAINER PRODUCTION

(ALL FIGURES ARE GROSS)

	Production		Shipments		Stocks	
	May, 1943	*May*, 1942	*May*, 1943	*May*, 1942	*May*, 1943	*May*, 1942
Food Containers (Narrow Neck, Wide Mouth and Pressed Ware)	2,756,997	2,197,041	2,829,808	1,966,921	1,572,455	2,291,247
Pressure and Non-Pressure Ware	584,580	454,944	584,008	507,844	339,855	539,870
Beer Bottles	827,668	1,108,155	819,131	1,148,088	149,125	302,184
Liquor Ware	722,912	799,689	797,641	813,678	725,691	1,724,075
Medicine and Toilet Ware	1,918,140	1,778,589	1,959,821	1,733,303	1,885,432	3,156,508
General Purpose Ware	671,208	473,384	681,841	441,403	434,746	557,756
Milk Bottles	188,021	242,605	193,803	259,129	353,406	380,158
Fruit and Jelly Jars	411,397	116,193	464,473	104,117	87,241	493,985
All Other	22,677	21,075	18,379	22,330	34,885	43,207
Total Industry	8,103,600	7,191,675	8,358,905	6,996,813	5,582,836	9,488,990

HOW TRENTON POTTERIES WHIPPED A TOUGH FIRING CONTROL PROBLEM

with **HAYS Instruments**

Many huge shapes go through the tunnel Kilns of Trenton Potteries—shapes of famous Duraclay, only one to a Kiln car, demanding utmost accuracy of firing control to prevent serious losses.

Trenton and Hays engineers collaborated effectively; and Hays Pressure Recorder and Automatic Pressure Control were installed to control pressure near the crown of the Kiln—the critical point. The operator sets the instrument for the correct pressure —and automatically the Control instrument adjusts the dampers to compensate for pressure changes.

Hays Equipment for the Ceramic Industry includes a full line of measuring, indicating and recording instruments, gages and meters, and complete systems of Automatic Combustion Control.

How these precision instruments can save time and money, materials and man-power in ceramic plants of every description, is described in Bulletin 42-552. Glad to send a copy on request—costs nothing, contains data worth a great deal.

The HAYS CORPORATION
COMBUSTION INSTRUMENTS ENGINEERS
MICHIGAN CITY, INDIANA, U.S.A.

automatic tumblers during May dropped 6 per cent below last month's figure to 4,596,683 dozens but increased 5 per cent over last year's corresponding figure. Total shipments for the 5 months ending May reached the level of 22,842,5.8 dozens—5 per cent ahead of last year. Stocks on hand at the close of May totalled 6,544,236 dozens.

Table, kitchen and household glassware: Manufacturers sales of machine-made table, kitchen and household glassware were reported at 2,995,788 dozens, a slight increase over last year's comparable month. During the 12-month period ending May 31, 1943, this trade increased 13 per cent over the previous 12-months' comparable period to 42,901,469 dozens.

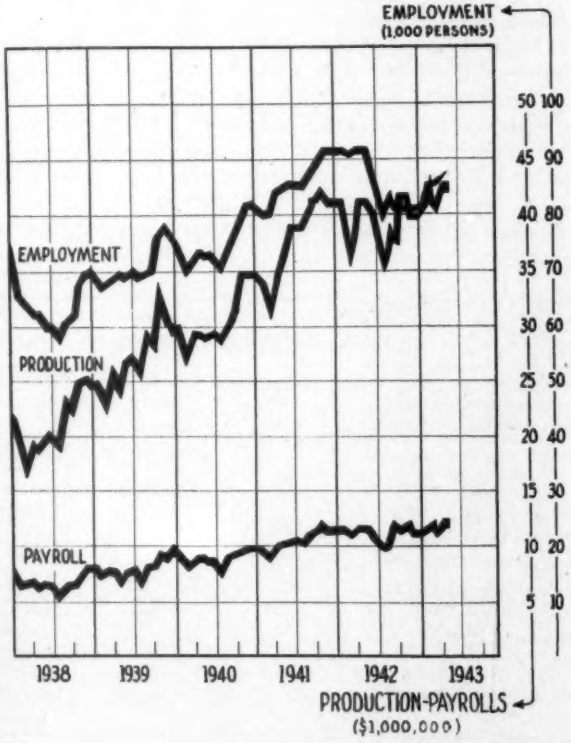
Miscellaneous glass products manufactured in April were valued at $16,000,000 according to reliable estimates. This was the same level as reported for March. During the first four months of 1943 this branch of the glass industry had a production of $64,000,000.

Employment and Payrolls: Employment in the glass industry during April amounted to 86,000 persons, a slight increase over March's total.

Payrolls in April were estimated at $12,500,000, the same figure as reported for March. During the first four months of 1943 glass manufacturers paid out approximately $60,500,000.

GI THE GLASS INDUSTRY'S INDEX

Monthly Trends Through April, 1943



RESTRICTIONS ON NON-STANDARD CONTAINER PRODUCTION EXPLAINED BY CONTAINERS DIVISION

Amendment L-103, issued June 3, 1943, by the WPB was further explained by the Containers Division by stating that it referred only to certain types of glass containers which vary in specified particulars from standards established by the order.

Order L-103 as amended on that date clarified and specified the respective dates before which certain types of non-standard glass containers must be manufactured in order to be used for packing each product which has been made the subject of standardization.

Such non-standard containers are limited to those which differ from the standards established by L-103 solely by reason of:

1. The location of indented or other label space.
2. The degree of curvature of the shoulder and heel of the container.
3. The amount and location of any lettering which indicates capacity only.
4. A difference in height or weight when such difference does not exceed 5 per cent of the height or weight shown for the applicable standard glass container.
5. The existence or location of stippling or fluting.

Under the order, glass containers possessing these minor variations can be used for a product which has been made the subject of a standardization schedule only if they were manufactured within nine months after that product was first mentioned in the schedule.

The dates listed on the accompanying table indicate when this nine-month period expires for each product.

However, to use the non-standard (but near-standard) containers manufactured prior to these expiration dates, the containers must be manufactured from a mold which was actually in existence prior to the date of issuance of any applicable schedule, and the design of such glass container must be submitted to WPB and approved within the specified exemptions.

Illustration: A glass container that differs from the standards established for chocolate syrup in one or more of the five specified respects can be used to package chocolate syrup if it is manufactured prior to January 5, 1944, and is made from a mold which was in existence prior to April 5, 1943, and specified approval of the varying design has been granted by WPB.

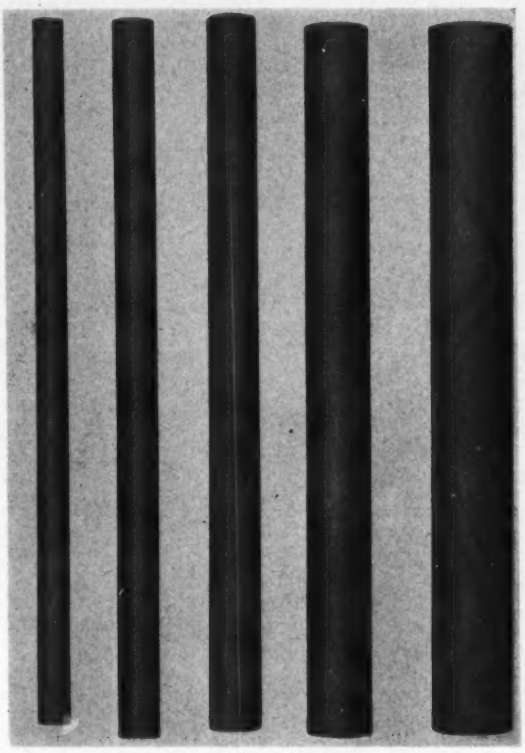
The designs should be submitted to the Containers Division, WPB, Washington, D. C., Reference L-103.

TABLE

Distilled spirits	Feb. 11, 1943
Malt beverages	Feb. 11, 1943
Fruit butter	June 12, 1943
Preserves	June 12, 1943
Jelly	June 12, 1943
Wines	June 12, 1943
Protective coatings	Sept. 7, 1943
Salad dressings (including products using salad dressing as a base)	Jan. 5, 1944
Olive Oil	Jan. 5, 1944
Edible oils (other than olive oil)	Jan. 5, 1944
Shortenings	Jan. 5, 1944
Maple syrup	Jan. 5, 1944

(*Continued on page* 308)

Malleable Iron Rods for plugging Moulds



3/16" 1/4" 5/16" 3/8" 1/2" 5/8" x 6"

IN the manufacture of Malleable Rods a "white iron" is produced Fe3C. The carbon is present in the combined form. The "white iron" castings are annealed or graphitized so that the final structure consists of ferrite (Fe) and free carbon (C) which is in the form of "temper" carbon.

This material is very soft and will pein readily.

Machinability

It is generally known, in commercial operations, Malleable iron machines more readily than other ferrous materials of equal tensile properties.

May we send you a descriptive booklet or answer questions on your specific problems?

Price of 15c each F.O.B. Rockford

GUNITE FOUNDRIES CORPORATION

ROCKFORD ILLINIOS

Established 1854

(*Continued from page* 307)

Syrups (except chocolate and maple), including blended, bottler's, cane, corn, molasses, sorghum, malt and fountain syrups	Jan.	5, 1944
Chocolate syrup	Jan.	5, 1944
Tomato catsup	Jan.	5, 1944
Chili sauce and cocktail sauce	Jan.	5, 1944
Tomato paste, not less than 25 per cent by weight dry tomato solids	Jan.	5, 1944
Tomato pulp and puree, not less than 10.7 per cent (specific gravity 1.045 or more than 25 per cent by weight dry tomato solids)	Jan.	5, 1944
Vinegar	Jan.	5, 1944
Fruits and vegetables and mixtures thereof, including ripe olives, but excluding cranberries and maraschino cherries	Jan.	5, 1944
Honey	Jan.	5, 1944
Pickles and relishes	Jan.	5, 1944
Peanut butter	Jan.	5, 1944
Fruit and vegetable juices and mixtures thereof	Jan.	5, 1944
Maraschino cherries	Jan.	5, 1944
Cranberries and cranberry sauce	Jan.	5, 1944
Pectin, liquid	Jan.	5, 1944

• George W. Aikins has been appointed plant manager for the Latchford-Marble Glass Company, manufacturers of bottles and jars in flint, amber and green.

OWENS-ILLINOIS GOES ON THE AIR WITH NEW TYPE RADIO SHOW

Furnishing answers to household problems caused by wartime shortages, with the cooperation of government agencies, the Owens-Illinois Company's new radio show called "Your Home-Front Reporter" goes on the air every afternoon, Monday through Friday, from 4 to 4:25 beginning with May 10. This unusual program limits commercials to short announcements of the sponsor's name and as W. E. Levis, chairman of the board of directors of Owens-Illinois, stated at the first broadcast, "Our problem is not one of sales, but rather one of service and supply."

The program also ties in with the war effort by stressing certain angles for the sponsor and other manufacturers, such as urging full and part time workers in food packing areas to enlist in the drive for manpower, and consumers are asked to return bottles in an effort to meet the limitations placed on container production.

Owens-Illinois is also using an entirely new type of advertising. Since they only manufacture the bottles for products packed in glass and some jars for home canning, the company is plugging indirectly leading manufacturers of packaged goods, such as mayonnaise, shaving cream, aspirin, syrups, beer, tooth paste, wine, cigarettes, soft drinks, beauty aids, etc.

Regularly featured on the program are Fletcher Wiley, home economist and philosopher; Soprano Eleanor Steber of the Metropolitan Opera, Frank Parker, tenor, and a 16-piece orchestra conducted by David Broekman.

PRODUCES A FLAME of HIGH VELOCITY-INTENSE LUMINOSITY

TYPE SAL NATIONAL AIROIL BURNER

★ Here is an oil burner, the choice of numerous glass plants for firing glass tanks and sodium silicate furnaces. It operates efficiently when using either steam or compressed air for atomization. Type SAL Burners require only infrequent cleaning and minimum of maintenance. Get these results as others have done . . . low fuel rates per ton, reduced furnace maintenance and superior quality glass.

FOR MORE DETAILS, WRITE US.

NATIONAL AIROIL BURNER COMPANY, INCORPORATED
1254 East Sedgley Avenue
PHILADELPHIA, PENNA.

OTHER PRODUCTS: Large Capacity Burners for Steam Generators, etc.; Combination Gas and Oil Burners; Furnace Peepholes; Refractory Burner Blocks in many sizes.

On top of . . . *tomorrow!*

Funny place for a man to make his office—especially if he doesn't happen to belong to an "open-air" cult.

But watching which way the wind blows is serious business these days, for war is constantly altering the direction which industry will take when peace returns. Shifts are sudden . . . and their effects are felt in unexpected places . . . influencing products, transforming plans.

From his panoramic vantage point the Wyandotte man is keenly attuned to the trend of events affecting users of chemicals. Alert to developments in the offing *now*, he is uniquely qualified to help you foresee the future's form.

In our technical laboratories, research continues on new applications of chemicals . . . new techniques to increase their efficiency and facilitate their handling. These war-born skills—teamed with a long-range *awareness* of what's doing in the world of industry—make Wyandotte a useful ally to call in.

• Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.

WYANDOTTE CHEMICALS CORPORATION
MICHIGAN ALKALI DIVISION • WYANDOTTE, MICH.

Wyandotte
OFFICES IN PRINCIPAL CITIES

SODA ASH • CAUSTIC SODA • CHLORINE • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • DRY ICE

CALCULATION OF DENSITY . . .

(*Continued from page* 298)

5. The reciprocal is then taken to obtain the desired density.

As an illustration of Method B, the following computations are given for one of the simple soda-silica glasses studied at Sheffield. This glass has the composition SiO_2—64.34%, Na_2O—35.66% and a density of 2.4941. (K is assumed to be 0.05):

	f_M		S_M	
SiO_2	= 64.34% =	.6434 ×	.0333	= .021425
Na_2O	= 35.66% =	.3566 ×	.016131	= .005752
			$\Sigma smfm$	= .027177

$$Nsi = \frac{.6434}{60.06 \times .0272} = .39$$

From Table II bsi = 4.21, v^1si = .2875,
from Table I v^1na = .2810

f_M	v^1_M	
.6434	× .2875	= .1850
.3566	× .2810	= .1002
	Σv^1mfm	= .2852

Substituting this data in equation 3:

$$\frac{1}{p} = (K + bsi)\ \Sigma s_M f_M + \Sigma v^1_M f_M$$

$$\frac{1}{p} = (0.05 + 4.26) \times .0272 + .2852,$$

$$\frac{1}{p} = .401$$

P = 2.4937 (Observed 2.4941)

BORAX
and
BORIC ACID
99½-100% PURE

NITRATE OF POTASH
CAUSTIC SODA
SULPHUR

Stauffer

STAUFFER CHEMICAL CO.
420 Lexington Avenue, New York, N. Y. 624 California Street, San Francisco, Cal.
344 Lake Shore Drive, Chicago, Illinois 550 South Flower Street, Los Angeles, Cal.

RELIEF AMENDMENT ANNOUNCED FOR MPR 382

The Office of Price Administration announced its first amendment to the Maximum Price Regulation 382 which rolled back prices on glass containers to the July 1, 1941 level. This new amendment gave manufacturers of wide mouth glass containers an alternative table of dollars and cents maximum prices. If any manufacturer can prove himself a "hardship" case he will be able to take advantage of the higher ceilings. However, he cannot do so unless specifically authorized by the OPA which has to review certain cost, price, and production data designated in the amendment. These ceilings are about 5 per cent higher for eastern sales and 7½ per cent higher for western sales.

A new table of ceiling prices was also established by the amendment for the Western Area replacing the maximum prices for standard containers. This set of prices is said to be a more accurate representation of the price levels of July 1, 1941. Western area manufacturers of glass containers will also be able to plead "hardship" and possibly secure further relief from the OPA.

The great demand for wide mouth glass containers and the small number of producers who would suffer financial hardship if they sold their merchandise at the reduced prices were the contributing factors responsible for the amendment.

BRITISH SOCIETY CONFERS ON POST-WAR PLANS

The British Society of Glass Technology held its twenty-sixth Annual General Meeting and 220th Ordinary General Meeting on April 13th at "Elmfield," Sheffield. The Ordinary Meeting was devoted to a Conference on the subject of "Education, Technical Training and Research for Post-War Developments in the Glass Industry."

"The glass industry, with its achievements of the past two decades in mind, will wish to plan wisely to ensure its prosperity and further progress after the war," said W. E. S. Turner, secretary of the Society.

• Dr. S. C. Ogburn, Jr., former acting research manager and technical supervisor in charge of new product development at the General Chemical Company, has been appointed manager of the Research and Development Department of the Pennsylvania Salt Manufacturing Co.

GLASS TECHNOLOGIST

Wanted for glass research. Experience or graduate training in glass technology necessary. Write giving draft status and full details of training and experience. Any negotiations must be in conformance with Employment Stabilization Regulations. Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.

PRODUCTION MANAGER

Experienced in manufacture of precision glass rod and tubing, for new industry using similar equipment. Vicinity New York City. State all qualifications, draft status, etc., to Box 68, The Glass Industry, New York (18), N. Y.

GLASSWARE INDUSTRY . . .

(*Continued from page* 296)

been diverted to producing service and combat items for the armed forces. Glass components of radar, X-ray tubes, and other electronic equipment used so extensively by the Army and Navy are being made by workers and equipment formerly engaged in making hand-made table glassware. A variety of glass lenses and signaling equipment for military airports—such as ground lights, which will stand 40,000 pounds of a bomber wheel, beacons, floodlights, code beacons, and so on—are now being made from melting units which turned out tableware and other utility glassware items.

Glass filters, developed to replace stainless steel filters in coffee percolators, are now serving as radio coil forms in combat radios to replace the ceramics which became critical. Facilities formerly used to make votive lights for churches are producing airplane running lights and Navy deck lights. One of the more remarkable glass developments of the war, and which uses personnel formerly engaged in producing civilian utility glassware, is the precision gage for accurate measurement of Army Ordnance parts. These gages should relieve critical tool steel for other military purposes.

Plants Meet Call

In the great speed required to equip the numerous military cantonments, the armed forces turned to the glass industry for particularly durable glass cups, saucers, plates, and tumblers. Glass plants engaged in producing civilian tableware, tumblers, and cooking utensils expanded their production to meet these quantity requirements. They also specially processed this glassware, placing it under internal tension, to achieve the durability it needed to combat the cantonment "KP."

Attempting to review in any great detail the wartime accomplishments of any progressive American industry is difficult because of the constant changes which take place; this is particularly true of an industry producing a material so versatile as glass. It can readily be seen, however, that the utility glassware industry, with little publicity, has efficiently adjusted itself to supplying essentials for the home and battle fronts.

HANES OF NATIONAL MORTAR RECEIVES DSC

Lt. Col. Robert Hanes, formerly superintendent of the Cold Springs, Ohio, plant of National Mortar and Supply Company, has just been awarded the Distinguished Service Cross for "gallant and courageous conduct during combat operations," according to word received from the South Pacific area. He is the son of John Hanes who has been with National Mortar for 26 years.

OPTICAL SOCIETY TO HOLD ANNUAL MEETING

The Optical Society of America will hold its 28th annual meeting in Pittsburgh, Pennsylvania, on October 7-9. The program will include symposia on spectroscopy, spectro-chemical analysis, and astronomy, in addition to other contributed papers. The meeting is open to nonmembers as well as members of the Society, and all interested persons are invited to attend.

THERE'S STILL PLENTY OF

Banner Lime

FOR YOU

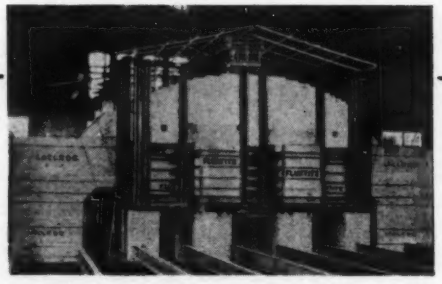
Though Banner Lime is serving the war effort in many ways, there is still an ample supply of this high quality, low iron content lime for you.

Freshly burned Fluxing Lime—gas burned, stable
Raw Dolomite Stone—various screen sizes

Essentially yours

In four essential industries — building, agricu'ture, steel and glass — Banner lime and limestone are essential.

NATIONAL MORTAR & SUPPLY CO.
Pittsburgh, Pa.



Complete Installations for Bottle Plants
Complete Installations for Window Glass
Complete Installations for Tableware Plants
Glass Melting Tanks and Furnaces
Refractory Materials—All Kinds and Shapes
Blocks—Fire Bricks—Prepared Pot Clay
Automatic Forming Machines
Automatic Feeders
Automatic Glass Tubing Machines
Lehrs-Annealing and Decorating
Installations Built to Suit Conditions Abroad

* * *

IF IT IS FOR THE GLASS INDUSTRY CONSULT US

General Glass Equipment Company
ATLANTIC COUNTY TRUST BUILDING
ATLANTIC CITY, N. J., U.S.A.

WANTED: Used Miller J. P. machine in good condition. Will buy or swap L. A. Lynch machine. Write giving price and full particulars. Glass Containers Limited, Winnipeg, Manitoba.

TWO MIXERS FOR SALE: 1-3 Ton Traveling Car Mixer Drum. Dimensions 6′ Diameter, 4′ Width; 1 T. L. Smith No. 148 Mixer—Known to the Building Trade as a one Batch Mixer, approximate Drum Dimensions 56″ Hole to Hole, 45″ Diameter. Rolland Glass Company, Clarksburg, W. Va.

WANTED: Superintendent for Bottle Factory in South America. Must be familiar with H.E. equipment. State experience and expected salary for at least one year's contract. Box 67, The Glass Industry, 55 West 42nd St., New York (18), N. Y.

SILK SCREEN STENCILS

Silk and metal mesh stencils of the resin type will meet the most exacting demands in glass decorating.

Long life—sharp printing—accuracy are assured with this new resin type stencil. Now being successfully used in color application for all kinds of glass products—from ash trays to scientific glassware.

May we submit prices on your screen requirements? • Write or phone.

Washington Stencil Products Co.

5726 Butler St. • Tel. Sterling 1520

Pittsburgh, Pa.

GAS-AIR-OXYGEN
BURNERS
ECONOMIZERS
MIXERS
GLASS ROLLERS
GENERAL GLASS WORKING EQUIPMENT
Glass working equipment manufacturers: glass ampules, vials, etc. Glass working lathes, bench fires and laboratory equipment of all types. Write for catalog
CHAS. EISLER
EISLER ENGINEERING CO.
742-50. 13th STREET

TANK FURNACES . . .

(*Continued from page* 292)

distance from the vertex of the hyperbola to the origin and the equation becomes

$$xy = \frac{a^2}{2}$$

This means that the curves for the smaller tanks will be more sharply bent approaching an L-shape, while the curves for the large tanks will tend to cut corners and come more nearly being diagonal lines.

These points are all clearly illustrated by the graphs in Fig. 2. Suppose the small tank were melting twenty tons, it would be melting on fifteen square feet which is practically loafing. The tonnage is increased to thirty and it is now melting on ten square feet, apparently a greatly increased performance. On the other hand, suppose the same tank is melting sixty tons, it is melting on five square feet. The boss wants ten more tons put on and it is now melting on 4.3 square feet, apparently only a slight improvement in performance. From now on, it is a labor of love; crowd on somehow all the tons you can and the performance figure barely changes. Before you could make a difference of one whole number in the performance figure, it would be necessary to reach the impossible pull of 95 tons. According to the "on square feet" notation, the kind of pulls you dream about are only a shade better than an ordinary good efficient load. This is what was meant when it was said that the hyperbola is backward. A loafing, in efficient furnace gets a great deal of credit for a modest increase in tonnage, while a furnace that is fighting its heart out gets practically no credit whatsoever.

If it were the other way around, the situation might be tolerable because the psychological benefits would tend to offset the mathematical deficiencies, but as it is we have both mathematics and psychology against us.

Perhaps this is enough to indict the culprit, but if further proof of guilt is needed, a little examination of Fig. 2 will show that the "on square feet" figures try to make you believe that it is easier to increase tonnage on a small furnace than on a large one. The hyperbolas do, however, offer opportunities for easy excursions into infinity if you go in for that sort of thing. Melting on zero square feet shows an infinite tonnage, a goal highly desired but unobtainable. A zero tonnage shows melting on an infinity of square feet, a rather quaint way of describing an idle tank. Hence, while the curves may possibly have some physical meaning over a short range near their center, they rapidly become meaningless on approaching either extreme.

Now note the pleasing contrast when Fig. 1 is examined. Take any part of either curve and you find that a 50 per cent increase in tonnage shows a 50 per cent increase in melting performance. At sixty tons the small furnace is melting twenty tons per 100 square feet which is not bad, but the big fellow at the same pull is only melting ten tons per 100 and ought to be ashamed of itself.

Now it is not as if you were being asked to learn something strange and foreign like Esperanto. The plea is simply to abandon an artificial way of thinking which you have had forced on you by custom; and to return

to the natural viewpoint which you instinctively take with all other numerical data you use. As they say in the advertisements, make this simple test. Take your slide rule and divide today's pull of a few typical furnaces by the melting area and jot down the tons per 100 square feet. If you don't find out a few things about your own operation which surprise you, our apologies will appear in the next issue. And notice how soon it is that you involuntarily start making mental calculations when some old-timer tells you that he is melting on such and such square feet.

ACCIDENT PREVENTION . . .

(*Continued from page* 297)

revealed as well as little habits that make for greater safety. Example: shutting off power when the worker leaves a machine. These points are such as are found operative in any glass factory.

"A Safe Day" is a companion picture to "Factory Safety," and usually is shown first though either film may be used effectively without the other. This motion picture tells a very interesting little human interest story, picturing just such a family as one would find in the average glass plant locality. Bill Jones is a worker with a safety record in his plant. We see him setting good examples for safety throughout his whole work day, and in everything he does.

His safety record, it is shown is not based upon luck, but on constantly *thinking safety*. In the picture, Bill Jones takes on many jobs and comes through with them all without injury because he lives a safe day.

There is no "preaching" in these films. They merely set up examples of safety conduct as suggestions—the most powerful kind of conduct education.

As a rule, the films are shown at separate meetings before groups in the glass plant—ranging from 20 to 75 persons. The personnel or safety director usually introduces the film with a short talk on its purposes, tying it in with the plant's own safety rules and policies. After the first showing of the film a period of discussion may follow, with questions and answers, and experiences of workers are heard as they are related to the facts pictured and described on the screen.

Then the picture may be shown a second time, with a summation by the meetings leader at the end.

Ned R. Dearborn, executive vice-president of the National Safety Council said recently:

"The effects of a broader national program of safety education are already being felt in virtually every department of American life. One of the major developments is the enlistment of the moving picture industry in the crusade against the accident menace."

COUCH MADE EXECUTIVE AT CHAS. TAYLOR SONS CO.

Everett G. Couch, Jr., formerly ceramic engineer with the Anchor-Hocking Glass Corporation, has beeen appointed executive in Sales and Development Engineering for the Chas. Taylor Sons Company.

Mr. Couch is a graduate of North Carolina State College and the University of Toronto and holds a Bachelors and Masters degree in applied science.

GLASS INSPECTION
with the *Polaroid*

Spectacle type polariscope

THE polarizing spectacle, mounted in unit with sensitive tint plate of 565 millimicrons, presents an absolutely uniform field of large aperture, strains showing up in sharply defined and correct colors.

Standard size apertures are 6" diameter and 12" diameter; but any special size to meet your requirement can be made. They are all light in weight and a leather case can be furnished where required. The 6" unit is suggested for either plant inspection uses or—as a portable unit for the trouble shooter or the salesman where a large aperture, compact unit of light weight is desirable.

THE POLARIZING INSTRUMENT CO.
630 Fifth Ave. (Rockefeller Center) **New York City**

I WAS CUT IN 5 SECONDS WITH A CLIPPER

Yes... YOU CAN CUT SILICA BRICK IN 5 SECONDS WITH A CLIPPER MASONRY SAW

'TAILOR-MAKE' SPECIAL SIZES

THE SPEED AND ECONOMY IS AMAZING!

You can easily cut any masonry material with Clipper Masonry Saws . . . Clay, Concrete, Magnesite, Sillimanite or Acid Resistant Brick.

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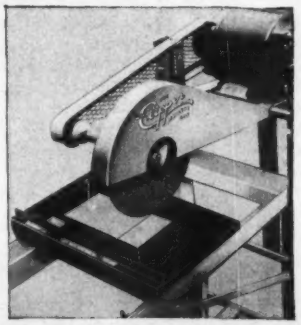

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INVENTIONS . . .

(*Continued from page* 300)

Basinski of Saginaw, Mich. They depart from the familiar principle in which an air blast catches up a molten particle or shot and impels it at such a velocity as to cause a tail to string out so as to form the fiber. Instead they use a process which forms almost no shot and seems to draw out the fibers from relatively stationary particles, "utilizing their inertia instead of momentum." The apparatus as shown in Fig. 4, consists of a high speed rotor set at an angle to the vertical, and having mounted at its rim a number of spinners, 4. When the spinners, traveling at about three miles per minute, are touched by the small stream of molten glass or slag, M, they depart so quickly as to draw instantaneously a droplet of glass into a thin filament so that there is practically no granular residue. The casing of the apparatus is like that of a conventional helical air blower with axial air intake and tangential discharge for air and fibers. The speed of the spinners is such as to create their own fiber clearing action.

Two other patents assigned to Owens-Corning are 2,318,243 and 2,318,244 issued to B. C. McClure of Chicago for the production of glass wool bats in apparatus of a type which provides a barrel-like conveying tube into which the fibers are directed preparatory to felting. In the first of these two patents the fibers are formed by a combination of air blast and centrifugal force. A stream of molten glass is blasted against a saucer shaped spinner from which the fibers are thrown toward the tubular collector.

To the already large group of American Rock Wool Corp. patents Daniel C. Drill of Wabash, Ind., has added 2,319,666 in which a fiber bat is formed by collecting blown fibers on a conveyor which forms the bottom of the fiber settling room, while directing air into the room through the sidewalls to bring about thicker deposition of fibers on the center of the conveyor.

BALLMAN TO HEAD NEW DOW CHEMICAL CO. DIVISION

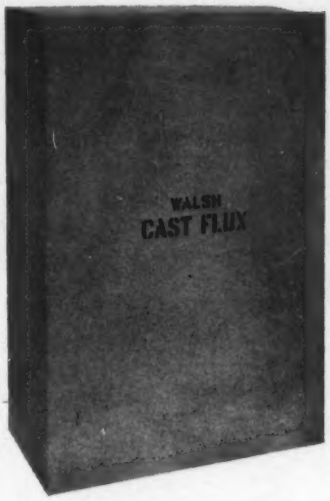
D. K. Ballman has been chosen to head a new service and development division in The Dow Chemical Company, which will develop new chemical products for America's use now and after the war, and extend the wartime usage of present products and facilities. Mr. Ballman has had eight years of product development and technical service work with the Dow Company.

This new division will be staffed by a group of experts selected for their full technical knowledge of Dow products and specific industries.

AMENDMENT TO WPB PRIORITIES REGULATION 3

Manufacturers of tumblers and tableware, kitchen, household and miscellaneous articles, etc., can now use their own discretion in allotting their production to sources which they believe should be supplied as a result of WPB Priorities Regulation 3 as amended June 4. This amendment prevents the ordering from producers of the above items under preference ratings which customers heretofore have been allowed to use under CMP No. 5 and No. 5X.

WALSH CAST-FLUX



The Vacuum-cast flux block of superior quality.

Walsh Cast-Flux blocks are machine-trued to exact size and shape after burning.

THEY LAST LONGER

The excellent results obtained in numerous tanks melting various types of glass has definitely established the efficiency and economy of Walsh Cast-Flux blocks.

Walsh Cast-Flux has a dense, uniform structure; it is burned at higher temperatures, is thoroughly bonded and possesses a low coefficient of expansion.

Walsh Cast-Flux blocks meet the most rigid requirements for tanks operating at higher temperatures . . . they insure greater tonnage, higher quality glass, freedom from defects, longer life and maximum economy.

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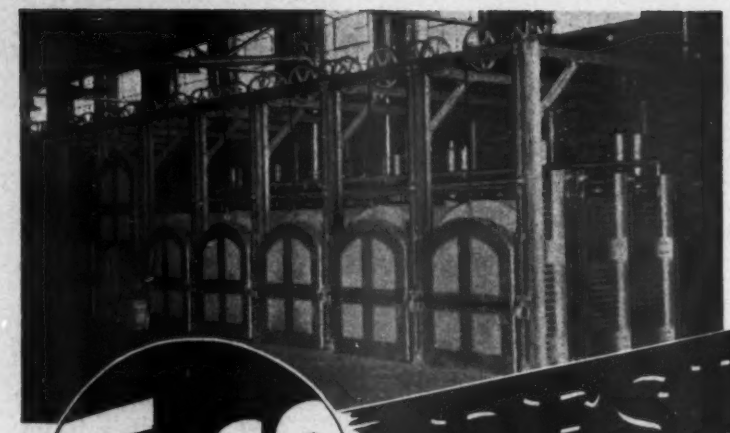
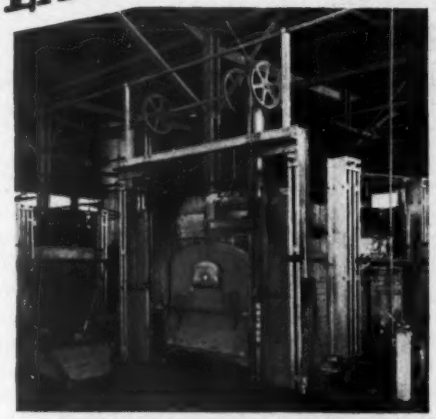


TECO DESIGNED
OPTICAL GLASS PLANT EQUIPMENT

As is well known, the manufacture of optical glass requires the use of equipment differing considerably from that of the conventional glass plant.

That TECO engineers have the requisite knowledge and experience to design and build this kind of specialized equipment has been demonstrated conclusively by their contributions to the optical glass plants built on this continent in recent years.



Above is illustrated a row of *eight* gas-fired, pre-heating pot arches detailed by TECO engineers and erected in a plant that received a great deal of favorable comment when opened some months ago.

At the right, center, is one of *fourteen* gas-fired, regenerative melting furnaces designed by TECO and erected in new plants in Canada and the United States. The photo shows only the upper half of this furnace.

At the lower right is a row of TECO designed, electrically heated, annealing kilns installed in a recently completed American plant.

If in need of expert service in the designing, re-designing or repair of glass manufacturing equipment, whether conventional or of special design, consult TECO engineers.

TOLEDO ENGINEERING Company

GLASS MELTING *and* MANUFACTURING EQUIPMENT

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